

Comparison of Radiation Dose & Risk

The following table compares radiation dose to EPA's lifetime cancer incidence risk, for various radiation regulations of doses/risks and those related to natural radiation doses. Unless otherwise noted, the chronic risk are calculated using Superfund defaults for **30-year lifetime**, 350 days/yr.

Items	Dose [mrem/yr]	Approx. Risk [chronic]	Reference
Prelim. Remed. Goals [PRGs]	~ 0.05 mrem/yr	1E-6 [or 1 in 1 million]	RAGS
Upper end of CERCLA risk range [10-6 to 10-4]	15 mrem/yr	3E-4	RAGS OSWER Dir. 8/97
Exposure limit from all radiation sources to the public:	100mrem/yr	2E-3 [or 1 in 500]	ICRP, NCRP, NRC 10CFR20 & states DOE Orders, ATSDR
Avg. Natural background dose to public in U.S.	~ 300 mrem/yr	6E-3	30-cosmic, 40 -internal, 30-ground, 200-Rn
EPA's Emergency Guide & FL's Remedial Action recommend for NORM	500 mrem/yr	1E-2 [or 1 in 100]	EPA's PAGs, & NCRP116 report
Acute radiation exposure, not chronic, blood effects	10,000 mrem [one time exposure]	acute risk	HPS, ICRP, NCRP

Comparison of risk vs. conc'n [pCi/g] for Radium-226

Generic Preliminary Remediation Goals [PRGs] for Recreational, Industrial, and Residential Scenarios.

These PRGs are taken from the web site: <http://epa-prgs.ornl.gov/radionuclides/>, using default parameters. [For the recreational PRGs Oak Ridge defaults were used]

Recreational PRGs [ED= 1hr/day, 75d/y,30yr]

Radionuclide	3E-4 risk	1E-4 risk	1E-6 risk [the PRG]	ESI maximum conc'n vs approx risk
Ra-226 (+D)	171 pCi/g	57 pCi/g	0.012 pCi/g	47 pCi/g = ~ 8.2E-5risk

Industrial PRGs [ED=8hr/day, 250d/y,25yr]

Ra-226 (+D)	7.4 pCi/g	2.48 pCi/g	0.0248 pCi/g	47 = ~ 1.8 E-3 risk
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Residential PRGs [ED=18hr/day,360d/y, 30yr]

Ra-226 (+D)	3.7 pCi/g	1.24 pCi/g	0.0124 pCi/g	47 = ~ 9.2E-3 risk
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Table of Annual & Hourly Radiation Doses vs Exposure Scenarios

[note: for homog. soil 1pCi/g ~ 2 uR/hr for Ra-226]

annual radiation dose rate	hourly dose rate for resid scenario	hrly dose rate for ind/commercial scenario
500 mrem/yr	79 microrem/hr [uR/hr]	250 uR/hr
100 mrem/yr	16 uR/hr	50 uR/hr
outdrFL bkgd~35mrem/yr [includes gamma rad from ground and sky]	6 uR/hr [above #s include this]	NA



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